DOCUMENT RESUME

ED 243 413 IR 011 022

AUTHOR Beckwith, Don
TITLE A Research Methodology for Studying the Learner as a Total System: A Conceptual Paper.
PUB DATE Jan 84
NOTE 20p.; Paper presented at the Annual Meeting of the Association for Educational Communications and Technology (Dallas, TX, January 20-24, 1984). For proceedings, see IR 011 020.
PUB TYPE Viewpoints (120) -- Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Design Requirements; Educational Objectives; *Educational Research; *Educational Researchers; *Models; *Research Design; *Research Methodology; Students; *Systems Approach

ABSTRACT

An alternative research methodology is presented which focuses on the aims and values of education while attending to the learner as an elaborate, dynamic, everchanging total system. A summary covers the reactive, preactive, proactive, and spiralling learner systems, each of which meet the definitional system requirement of being dynamic, having a goal, and having interdependent and interrelated components. Implications of this view for research are examined. The description of the research methodology, which is based on Beckwith's 1983 theoretical/conceptual paradigm, elucidates its underlying assumptions, focus, nature, and management. Discussion then covers the roles of the investigator, subject, manager, and design structure during operation of the research methodology. Three purposes of the design structure are described: to facilitate solutions to educational problems, to attend to the elaborate nature of learners as dynamic changing individuals, and to effect research reliability and validity. A specific account is provided of how the methodology would be operationalized, suggesting how validity, reliability, reproducibility, bias, and effects would be addressed during the process. The roles of the components of the dynamic design structure are also examined. Four figures and a 32-item reference list are included. (LMM)

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A Research Methodology for Studying the Learner as a Total System: A Conceptual Paper

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Don Beckwith
Centre for Educational Development
Dundee College of Technology
Dundee, Scotland DD1 1HG

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Introduction

background

It has been noted by many educational researchers in recent years that our traditional research methodologies, especially conventional experimental designs, seem to be unable to provide meaningful application to the practice of education. Experimental designs seem to be lacking in their ability to identify the "process variables that could improve teaching" (Scriven, 1977, p.189); their application appears not to facilitate solutions to educational problems (Clark, 1978; Clark & Snow, 1975; Salomon & Clark, 1977; Snow, 1976). In seeking reasons for the apparent shortcomings of experimental design research, focus seems to center upon the methodology's unrealistic restrictiveness (Enzer, 1977), a restrictiveness that seems to be the result of tightly-controlled experimental variables. Such tight control appears to markedly restrict retest reliability of findings (Barr, 1929; Calkins, et.al., 1978; Shavelson & Dempsey, 1975) and to significantly limit generalizability of results Cronbach, 1975; Ebel, 1967; Gage, 1982; Pereboom, 1971).

problem

In reaction, there have been calls for alternatives to the structure of research design (Shulman, 1970) and the "modes of inquiry within our research endeavors" (Koetting, 1983, p.430). More specifically, researchers have asked for research models that reflect and are appropriate to the practice of education (Becker, 1977; Clark, 1979; Shulman, 1970); and for research paradigms and methodologies that address the whole learner as a total system (Beckwith, 1980; Clark, 1980; Winn, 1975), nonreductionist approaches to research which attend to the elaborate nature of learners as dynamic, changing individuals (Merrill, 1975; Torkelson, 1980), research that focuses on the aims and values of education (Rosenow, 1976).

theoretical/conceptual base

Such requests demand a complex, sophisticated research paradigm founded firmly upon a theoretical/conceptual base, a base that incorporates alternative modes of valid rationality (Koetting, 1983). Beckwith (1983) has provided such a base. Following four years of constructionist research, he has developed a theoretical/conceptual paradigm of the learner as a total system. Within the paradigm four types of total learner systems have been identified and explicated according to the following categories of critical attributes:

(a) motivation;
(b) response to external variables;
(c) response to intervention;
(d) predominant strategies;
(e) transition possibilities, facilitators, inhibitors, and control;
(f) reason for goal;

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(g) relation to goal;
(h) type of interaction and interrelation of system components; and
(i) type of dynamism.

In short, Beckwith's paradigm focuses upon the aims and values of education while attending to the learner as an elaborate dynamic, everchanging total system. A summary of the paradigm's four learner systems follows (exerpted from Beckwith, 1983).

The learner may be seen as four distinct systems, reactive, preactive, proactive, and spiralling, each of the four systems meeting the definitional system requirements of being dynamic, having a goal, and having interdependent and interrelated components. The differences lie in the nature of each system's goaland the relation of the goal to the dynamism of the system components. For the reactive learner the goal is internally oriented, survival focused; thus the dynamism is incidental, reacting intuitively to external variables. For the preactive learner the goal is output oriented, focused towards urdefined betterment; the dynamism, being externally programmed, is related to the goal attainment process rather than a specified goal product. For the proactive learner the goal is outcome oriented, focused on solving self-predefined problems; the dynamism is thus purposeful, related to goal attainment. For the spiralling learner the goal is value structure oriented, focused on self-regeneration; the dynamism is intrinsically automatic, related to a continued process of spiralling, regenerative goal setting and attainment. (See Figures 1 and 2).

PLACE FIGURES 1 AND 2 ABOUT HERE

Just as the goals and dynamism of each learner system are different, so too is the predictability of exhibited behaviors. The reactive learner's behavior is unpredictable; reacting to external variables, the behavior will either be acceptance, denial, or denial and then acceptance (conscious or unconscious). The preactive learner, out to satisfy the social order, may exhibit highly predictable behaviors. The proactive learner's behavior is predictable within the framework of self-established goals, i.e. problems to be solved. The behavior of the spiralling learner, like that of the reactive learner, is unpredictable, for the learning process is very akin to intuition, only the spiralling learner's intuition is purposeful, being effective in spite of the learning environment.

the reactive learner system

Reactive learners are survivors, reacting - unconsciously and intuitively - to external variables and intervention of contradictory information by absorbing or rejecting them as quickly as possible. The only goal is maintenance of an unthreatened ecological system. The reactive learner system absorbs and stores information to be retrieved as stored.

the preactive learner system

While many of the equilibrium maintenance behaviours of the reactive learner (operating as a natural system) are present in the preactive learner (operating as a synergystic system), the preactive learner's behaviors are far more conscious and socially acceptable; the "rules" for equilibrium maintenance have become institutionalized, i.e., the individual has adopted the society's mores for learning survival.

The preactive learner system receives appropriate information in appropriate formats, as so deemed by the educational system. As skills increase, the preactive moves closer and closer (like externally-bound concentric circles) in harmony with the undefined goals of the educational system.

the proactive learner system

The proactive learner operates well from a traditional base, providing self-motivation, extracting essential bits from information presented, welding bits from storage and alternative sources, building himself a personalized system to facilitate personalized goals. External intervention is avoided, self-control and reinforcement being preferred. The proactive learner system uses information gleaned from the educational system to attain goals that are not those of the educational system.

the spiraling learner system

It may be said that so sophisticated is the spiralling learner system that learning tends to occur in spite of the learning environment, for this learner is able to extract out of context and rapidly assimilate into the spiral at a very high level of discrimination and purpose. The spiralling learner system productively applies information for continued self-regeneration.

transition

Transition is possible from some learner systems to others. Transition from reactive to preactive is generally possible through prolonged subjection to a social structure, spurred on by peer, institutional, and social pressures. Transition from reactive to proactive is generally possible through counter reaction to current/predominant social order, spurred by a need for independence and social conscience. Transition from reactive to spiralling is generally possible thorugh intuition, spurred by altruistic feelings and concerns. Transition from preactive to proactive is generally possible through gut-wrenching upheaval, spurred by dissatisfaction with the established order. Transition from proactive to spiralling is generally possible through practice, spurred by internal motivation. (See Figures 3 and 4).

PLACE FIGURES 3 AND 4 ABOUT HERE

It is hoped that the paradigm, after significant further testing, may serve as a theoretical base for innovative, learner-centred instructional development and research methodologies.

implications for research

As mentioned earlier, with our reductionist approach to research (experimental design) we have ignored the elaborate nature of learners as dynamic, changing

individuals (Torkelson, 1980). Is it possible that our research paradigms/methodologies reflect and explore only the preactive learner? Are the mean performances all exhibited by the preactive learner? For the most part, research in education seems to view the learner as being part of an educational system, whether such system be a classroom, subject, course of study/curriculum, or school. We look at the learner's progress in terms of the goals of this educational system, attempting to identify variables which may enhance or inhibit learner progress in reaching such goals. This could indeed be labelled as a preactive learner research tradition. Whether we look at research in aptitude-treatment interaction, cognitive styles, or learner attitudes, to name a few of the most recent research thrusts, the emphasis is the same, that of examining the learner as part of a system, i.e., a given educational system, a system dedicated to the preactive learner, who in turn is dedicated to the system. Such research, it seems, even assumes that all subjects are preactive learners, differing only in their preactive learning ability. All learners, however, are not preactive; the nonpreactive learner's reactions to external variables are, from a preactive standpoint, unpredicatable and ungeneralizable. The reactive learner will absorb or deny external variables in a quest for survival. The proactive learner will use or ignore external variables depending upon their potential usefulness in self-goal attainment. The spiralling learner will use all external variables productively for continued self-regeneration. The non-preactive learner is not operating within the goal structure of the societal system, but rather is operating in spite of this goal structure, yet through our preactive research designs and questions we are expecting, without realising it, the nonpreactive learner to behave preactively.

Perhaps it is time to view the educational environment as part of the learner's system. Our research then could look at the educational environment's progress in terms of enhancing or inhibiting the learners' attainment of their own goals. What are the variables within the educational environment which inhibit or enhance such goal attainment? How do learners' incorporate external variables into their own learner systems? This will not be an easy shift to make, for our whole socio-scientific research tradition is based upon the preactive learner model; we strive to learn, to discover, with no predefined goal in mind, but rather merely the goal of more complete understanding of what is (with the underlying belief that such more complete understanding will somehow improve us). By exploring, discovering and applying (if possible), our preactive research mode keeps alive the synergystic dream that the total of our discoveries will be greater than the sum of its parts. As long as our research efforts are confined to the framework of our own system goals, the answers to such questions as how the learner, especially the nonpreactive learner, represents an experience or perceives during the learning process will remain mystery.

In any case, more research, of course, is needed - research that explores, in nontraditional ways, the nonpreactive as well as the preactive learner system; research that looks at the transitions within and between learner systems; research, in short, that attempts to validate the assumptions inherent within the conceptual/theoretical paradigm presented here.

alternative research methodology

This paper will present an alternative research methodology based upon Beckwith's theoretical/conceptual paradigm, elucidating on the methodology's

(a) underlying assumptions,
(b) focus,
(c) nature, and
(d) management.

This will be followed by a discussion of the roles of investigator, subject, manager and design structure during operation of the research methdology.

assumptions

Since the methodology is based upon a total system learner paradigm, it is "assumed that each and every learner may be viewed as a (system) in and of itself, not only as a (system) that is but also as a (system) that could be. Even though the ... learner ... will hold together as an entity in spite of what educators may or may not do, its finer potential lies in its capability for becoming what is wishes to become. In any ... learner the ingredients are all there, even if some of those ingredients are knowing that some of the essential ingredients are not yet there; the potential of all ingredients is there." (Beckwith, 1980, p.332). Each learner, therfore, may be studied not only as an existing, dynamic system but also as a potential, dynamic system. By studying the nature of the learner's critical attributes (the categories of which are mentioned earlier) determinations can be made concerning the learner's exisitng system, former system(s), potential system(s), and paths of transition. With such data on each learner system, it is assumed, researchers/educators may tailor the educational environment to facilitate desired learner outcomes, i.e. learner goals. To accomplish this, the learner must be accepted as full partner in the research development effort. If formally stated, the learner as total system paradigm rests on the assumptions that:

(a) there are two realities (the existing reality upon which inquiry can converge, and the potential reality which inquiry can effect) and that all parts of reality (existing and potential) are interrelated and interdependent so that the study of or inquiry into any one part necessarily influences all other parts;

(b) the inquirer and object, for best results, are one, with the investigator - playing the role of facilitative co-researcher. Thus the relationship between the inquirer and the object of inquiry is neither one of independence nor dependence, but rather one of mutual introspection and creation;

(c) each learner is currently operating as a total system, and can create a potential total system; and

(d) generalizations, to other populations, concerning the nature of goals, dynamism and transitions of learner systems, is possible.

focus

Whereas traditional experimental design methodologies look at data in a frozen, controlled fashion - isolating and then correlating variables in an attempt to find out "what is" - this alternative methodology looks at data as part of a growth phenomenon, dynamic, constantly changing; looks at the processes of transition, system creation, regression in an attempt to find out "what is becoming" and "how". The focus, rather than being on tightly-controlled variables, is on the dynamism of the total system, on the everchanging interrelationships and interdependencies of the system components. The focus, rather than being within the framework of the goals of the educational system, is within the framework of the goals of the learner system.

nature

The methodology in action might be described as a dynamic collection-analysis-decision system of interrelational events, a sifting-sorting-cataloging of observed, felt, and thought behaviours in order to more purposefully analyze the next behaviour(s), using, at times, the interjection of appropriate feedback, comment, reinforcement, questions, disruptions to elicit whatever behaviors will emerge. As on-going/changing research in an on-going/changing context, this methodology

(a) maintains the dynamism of system by embracing all variables;

(b) collapses the element of time between the typically separate activities of research and application;

(c) protects the inherent uniqueness, individuality and personality of the studied systems (focusing upon the extremes as well as the central tendencies);

(d) protects the integrity of the system interactions; and

(e) performs during real time, within dynamic systems, while attending to validity and reliability.

Variables are not isolated, but rather interrelationships and interdependencies of variables are explored and welcomed as they are; there are no variables that are capable of confounding, for it is accepted that all variables naturally affect all other variables and may only be controlled by being allowed their full natural freedom of expression.

In the sense that the methodology is so precisely defined, applicable to each and every dynamic learner system, generalizability is complete. Each learner system is a special case, with the focus being in-depth truth-seeking, finding that which is generalizable from him to him (or her to her) within a given point in time and/or from him or her "now" to him or her "future". Thus the methodology provides generalizability within each learner system studied and also to any and all populations, i.e., it is capable of achieving the same level of significance with each learner system.

management

While the complexity and number of interrelating and interdependent variables may appear forbidding, management of this research methodology, while certainly unusual, is not that difficult. Given

(a) the framework of expectations provided by Beckwith's paradigm,

(b) acceptance of the learner system's own goal as the context of the research study,

(c) acceptance of the learner system itself as a co-researcher in the process, and

(d) the view that the researcher and the educational environment are components of the learner's system, the seemingly formidable task becomes one of relative ease.

For the researcher as part of a defined, dynamic, goal-directed system with his or her purposes known and welcomed by the system itself, becomes comfortable with and adept at studying the dynamic interrelations and interdependencies of which he is part. As the comfort and aptitude increase, the researcher is quite quickly able to study more and more learner systems

simultaneously, applying ever more increasingly and successfully what he has learned as part of each studied system to each newly-encountered system.

operation of the research methodology

It is the purpose/intent of this section to give a more specific account of how the methodology would be operationalized while at the same time suggesting how such as validity, reliability, reproducibility, bias and effects are attended to during the process. The actual techniques of the methodology are not delineated, but rather are alluded to.

For this methodology, the trained educational researcher is called the investigator-researcher, the learner system under study is called the subject-researcher, and the data interface coordinator (whether this function is provided by either or both of the co-researchers, a computer, or a specialist) is called the information manager. These three roles-investigator-researcher, subject-researcher and information manager-create the interactive dynamism of the design structure. (See Figure 5).

Through the interaction of the three components, the design structure facilitates fulfillment of the purpose of the research design - to (a) determine the nature of the current learner system (b) determine the nature of the current learner ability level, (c) determine the nature of the desired (by the learner) learner system, and/or ability level and (d) determine the most appropriate transition means. In order to do this the situation within which the design structure operates must be one in which the subject-researcher may be observed, by self and the investigator-researcher, during the learning process. There must be access to a large variety of instructional information in a large variety of formats. As Merrill (1975) has suggested:

> ... what is needed is a dynamic general strategy enabling learners to select at any moment the particular tactic that is optimal for their unique configurations of aptitudes at that moment in time. Furthermore, they must be able to select a new tactic at a moment's notice. They must **not** be required to anticipate their aptitude configuration or the tactic needed more than one step ahead. They must be able to make the change with a minimum of effort. (If all their time or even a significant part is used up in the mechanics of tactic selection, their learning continuity will be grossly impaired.) They must know how to select a variety of tactics. They must have a wide variety of tactics available to them but not so many that they are overwhelmed by the number of choices. They must be provided a procedure for adapting slowly to this dynamic instructional environment since all their previous experience has been fixed treatments which have been administered to them and over which they have had little or no control.

The learner, going through such instructional information (if the formats are varied sufficiently enough to represent the continuum from passive reception through interaction to creation) will, it is hoped, demonstrate his current learner system and ability level. To facilitate the process, the investigator-researcher, reacting to subject-researcher requests and information manager suggestions (based upon an analysis of the effectiveness of instructional information [content and format] for eliciting attributes),

supplies each next piece of instructional information. The information manager supplies the subject-researcher with learner system profiles, based upon an analysis of (a) the learner's process of inquiry while going through the instructional information, and (b) the classification of demonstrated and communicated attributes (fed in by the investigator-researcher). The subject-researcher and investigator-researcher work together to analyze the incoming learner system profiles, which analyses are fed back to the information manager. Once the learning process has begun, the above procedures are simultaneous and interdependent (See Figure 5).

role of the design structure

There are three purposes of the design structure: (a) to facilitate solutions to educational problems, (b) to attend to the elaborate nature of learners as dynamic, changing individuals, and (c) to effect research reliability and validity. These are accomplished by initiating a dynamic set of interactions and interdependancies between the three major elements of the research - the subject-researcher, the investigator-researcher and the information manager. How the structure enhances the satisfaction of these purposes is discussed below:

facilitating solutions to educational problems

In order to facilitate solutions to educational problems, it is felt that a research design structure should (a) focus on the aims and values of education. (The questions that can be attended to through this design structure are those derived from a theoretical base, thus increasing leverage and reducing uncertainty); (b) reflect and be appropriate to the practice of education. (Since the users of the research results provided via this design structure are learners, and problems researched focus upon the inefficiency and ineffectiveness of learning, it may be assumed that the problems are operationally important to the user); and (c) identify the process variables that could improve teaching (Since the co-researchers are able to apply results as received, action decisions can be based on inferences drawn from the research data.)

attending to dynamic learners

By attending to the elaborate nature of learners as dynamic, changing individuals, this design structure tends to minimize (a) bounding problems by allowing the co-researchers to continuously narrow their scope of investigation-through the process of causal inferencing - as they get closer and closer to learner system and ability determination; and (b) focusing problems by organizing and ascribing meaning to collected data within the parameters of the learner as a total system paradigm. In addition, continued dynamism is effected by ensuring that data collection and data analysis occur in syncopated harmony, forming a symbionic relationship - each guiding, feeding, nurturing, leading, following the other - acting as a team, in consort toward the same end. Thus the research process is structured and restructured within real time by collapsing the time between research findings and applications. This nonreductionist type of control through acceptance of all variables is the key to researching a dynamic system.

effecting validity and reliability

By not using tightly-controlled experimental variables which tend to markedly restrict retest reliability of findings and to significantly limit generalizability of results, unrealistic restrictiveness is not a limitation of this design structure.

Generalizability is maximized not by controlling individual variables through isolation and treatment, but rather by controlling the complete set of variables within the structure of the total system framework. What is generalizable is the systemic nature that is true for each learner. It matters not and affects generalizability little if the components differ somewhat from system to system; since all subjects are systems, it is fairly easy to predict correctly the range of possible outcomes elsewhere, with other subjects, at other times. The generalizability of results is enhanced, in part, by maximizing freedom from artificially structured environments; as the subject-researcher inquires into the nature of his current learner system, he is allowed to begin virtually anywhere and to move anywhere in each succeeding step.

Generalizability also benefits from the enhancement of reproducibility; for example, sample size is minimized (one subject-researcher) as is bias, through the sharing of perceptions, input and output by the co-researchers and the information manager; and also random error, by continually feeding all steps of all processes to the information manager which analyzes all potential discrepancies within the system framework.

By structuring a real learning environment and by allowing the subject to be a conscious and integral part of the research, generalizability is further enhanced by minimizing reactivity.

Retest reliability is enhanced by teaming the subject-and investigator-researcher with the information manager in order to maximize objectivity and minimize bias. The built-in two way communication between all three research components of the design structure tends to give a reliability control to the dynamic process of data collection, analysis and application. Since all subjects are assumed to be total learner systems and a sample of one recommended for each experiment, random sampling is relatively easy. The design structure does not inhibit random sampling within the context of a disproportionate stratified design, e.g., one could randomly select subjects from a population of only one type of learner system.

Within the context of a total system all variables are dynamically related to all other variables. To study the system is to study the dynamic relationships of all variables, to embrace all variables. The notion of confounding variables is not, therefore, relevant to the study of learners as total systems.

roles of the components of the dynamic design structure

As mentioned earlier, the subject-researcher, the investigator-researcher and the information manager perform as interactive and interdependent entities of this dynamic research system. Each has a vital role to play, and each depends upon the other two in order to fulfill its role. In traditional research of dynamic systems, i.e., learners, an attempt is made to freeze reality, to make a dynamic system static, in order to study it. In so doing, the relationships studied are no longer true representations of reality; the detached observer of a dynamic system relinquishes control.

In this alternative research, in order to gain and maintain research control of a dynamic system, the researcher attempts to enter the system, interact with the system, and become a dynamic component of the system. The subject-researcher, of course, is able to achieve this complete incorporation of researcher and subject. The inclusion of subject as researcher is essential if the research is to extract and study the internal cognitive processes (e.g. selection, organization) that only the learner may be aware of. Thus the subject-researcher, by applying meta-cognition, is able to share with the investigator-researcher and the information manager the selective learning processes and cognitive organization processes that are operating.

If the subject-researcher (probably not as yet skilled in the processes of controlled inquiry) is to perform the causal inferences required by the research paradigm, tutoring, modeling, and support will be required by the investigator-researcher. As a competent inquirer, the investigator-researcher will coordinate and oversee data collection and analysis procedure, whether such data and analyses are initiated by self, and or the subject-researcher, and/or the information manager. This is necessary because the investigator-researcher is the one who is able to look beyond the experimental data and suggest decisions based also on learning theories (Allen, 1975). Unlike traditional research endeavours, this type of research may indeed benefit from the presence of certain effects. For example, the investigator-researcher may decide to encourage the Hawthorne effect in the subject-researcher in order to stimulate increased interest in and ownership of the research task at hand; similarly the John Henry effect could be encouraged to get the subject to try harder. The investigator-researcher might even allow himself to be biased by the Halo effect, i.e., seeing the subject-researcher as capable of performing the research, each positive step leading to each succeeding positive step, thus reinforcing the halo image.

Primarily, the investigator-researcher's role is that of facilitator, providing the requested and/or recommended instructional information (reflecting appropriate content and format); ensuring reliability and validity (as mentioned earlier); and working closely with the subject-researcher through the processes of data collection, causal inferencing, predictions, and applications based upon data and theory. Realizing that "social/behavioural phenomena exist chiefly in the minds of people, and (that) there are as many realities as persons" (Guba, 1981, p.77) the investigator-researcher must remove himself sufficiently to allow the subject-researcher to determine and understand the current learner system and, at the same time, involve himself sufficiently to ensure that such learner system determination and understanding is based upon appropriate, necessary and sufficient data.

As the subject-researcher takes more responsibility for the research, the investigator-reseacher becomes a less significant component of the learner system, thus allowing the investigator-researcher to introduce himself as a significant component within other learner systems. If at the same time, during this growth of learner systems as independent researchers, the investigator-researcher structures the environment so that studied learner systems can share and compare data, inferences and findings, the research process becomes even more independent of the investigator-researcher. At very least the investigator-researcher is assuming a role quite different from the usual - a role of facilitator, component of many learner systems, manager of other-defined research agendas rather than of self- or pre-defined research agendas.

For the investigator-researcher to facilitate the inquiry process for the subject researcher, information concerning the on-going learning process must be made available in usable form. The information manager will provide data on the learning processes employed by the learner, the effectiveness of instructional information, as well as a series of increasingly sophisticated learner system profiles (to include the attribute categories of motivation; response to intervention; response to external variables; predominant strategies; successful learning environments; transition possibilities, facilitators, inhibitors, and control; and ability level indicators). To produce the profiles, the information manager will analyse incoming data along the following interaction dimensions: (a) contextual (What meaning does the learner appear to attach to phenomena?); (b) sequential (What is the order of the steps being followed by the learner?); (c) categorical (What categories - in requests for instructional information, in causal inferencing, in interaction with the instructional information and the investigator-researcher - is the learning using?); (d) integral (How is the total learner system operating, i.e., what are the apparent interactive and interdependent relationships between system components?); and (e) analytical (What methods of analysis is the learner using?).

If a micro-computer is being used to provide an interactive learning environment as one of the learner options, it may be possible to program the computer to function as the information manager. An added advantage is that during all interactive learning via the computer, the computer could keep a record of the processes followed by the learner.

conclusion

Recently there have been calls for (a) more global and less laboratory type research; research which allows subject investigation rather than excluding the subject through placement in an artificially-created system (Bruner, 1983); (b) more formative types of research (Parkhurst, 1982); (c) "a more positive and accurate concept of human potential" (Bloom, 1982, p.12); (d) research means for coping with the proliferation of relevant kinds of individual differences to be studied (Gagne & Dick, 1983); (e) encompassing "value systems and idiosyncracies of individuals in the large purpose of schooling and society"(Torkelson, 1977, p.); (f) solving, the problem of "how to serve the needs of theory and action simultaneously"(Bynner, 1980, p.14); (g) selecting a "paradigm (of disciplined inquiry) whose assumptions are best met by the phenomenon being investigated" (Guba, 1981, p.77); and (h) providing the individual with the opportunity of "self-growth and self-direction so that (he) can make his own bargain with life in accordance with his beliefs and values" (Grayson, 1976, p.131).

It is hoped that the learner as a total system research paradigm will offer a pathway toward answering these calls. Rather than throwing away traditional (older as well as newer) paradigms and methodologies, this paradigm incorporates all. For example, such ATI attribute variables as anxiety, achievement via independence and achievement via conformity (Snow, 1976) are incorporated within the reactive, spiralling and preactive learner systems respectively; quantitative as well as qualitative data are systematically collected, analyzed and acted upon. By incorporating aspects of rationalistic and naturalistic inquiry within the framework of the learner as a total system, the limitations of each tend to be minimized.

Figure 1

The Systemic Nature of Learner Systems

	Goal Relation	Goal Orientation (Focus)	(Purpose) Type of Interaction and Interrelation of Components	Type of Dynamism
reactive	status quo	maintenance	filling gaps, protecting, mending	reflex
preactive	output	evolution to higher level of quality	seeking, comparing, contrasting, systematic	guided (externally)
proactive	outcome	problem-solving	goal-directed systemic	focused
spiralling	epitomization of value structure	self-regeneration	lateral transfer	intrinsic

In order to classify learner systems (all of which have goals, interacting/interrelating components, and dynamism) it is necessary to analyze the systemic workings within each learner system, i.e., (a) what is the relation of goal to system? (b) what is the orientation (focus) of the system goal? (c) what is the purpose of the interactions/interrelations of system components? and (d) what type of dynamism does the system maintain? While such analysis is necessary in order to establish each learner system's basic structure and orientation, it is not sufficient for complete classification. In addition, the subsystems of motivation, response to external variables, response to intervention, predominant strategies, and successful learning environments should be analyzed. (See the text for each learner system for a fuller explication.)

Figure 2

Summary of Four Learner Systems

	Motivation	Response to External Variables	Response to Intervention	Predominant Strategies	Successful Learning Environment
Reactive	survival	absorbtion	rejection and/or absorbtion	reception	mentor
Preactive	social acceptance	acceptance	acceptance	accommodation	teacher-directed
Proactive	internal reinforcement	sifting and sorting	challenging resisting denying	introspection	traditional*
Spiralling	altruism	applied absorbtion	systemic information	dissonance	any†

*The proactive learner system, learning in spite of the learning environment, uses the traditional environment, i.e., that environment that is fashioned/structural for reactive and preactive learning, to react against, to reject, during the process of creating his own systems.

†Any environment, whether structured for learning or not, if it provides information, has potential grist for the spiralling learner's mill.

Figure 3

Learners As Systems: Transitions

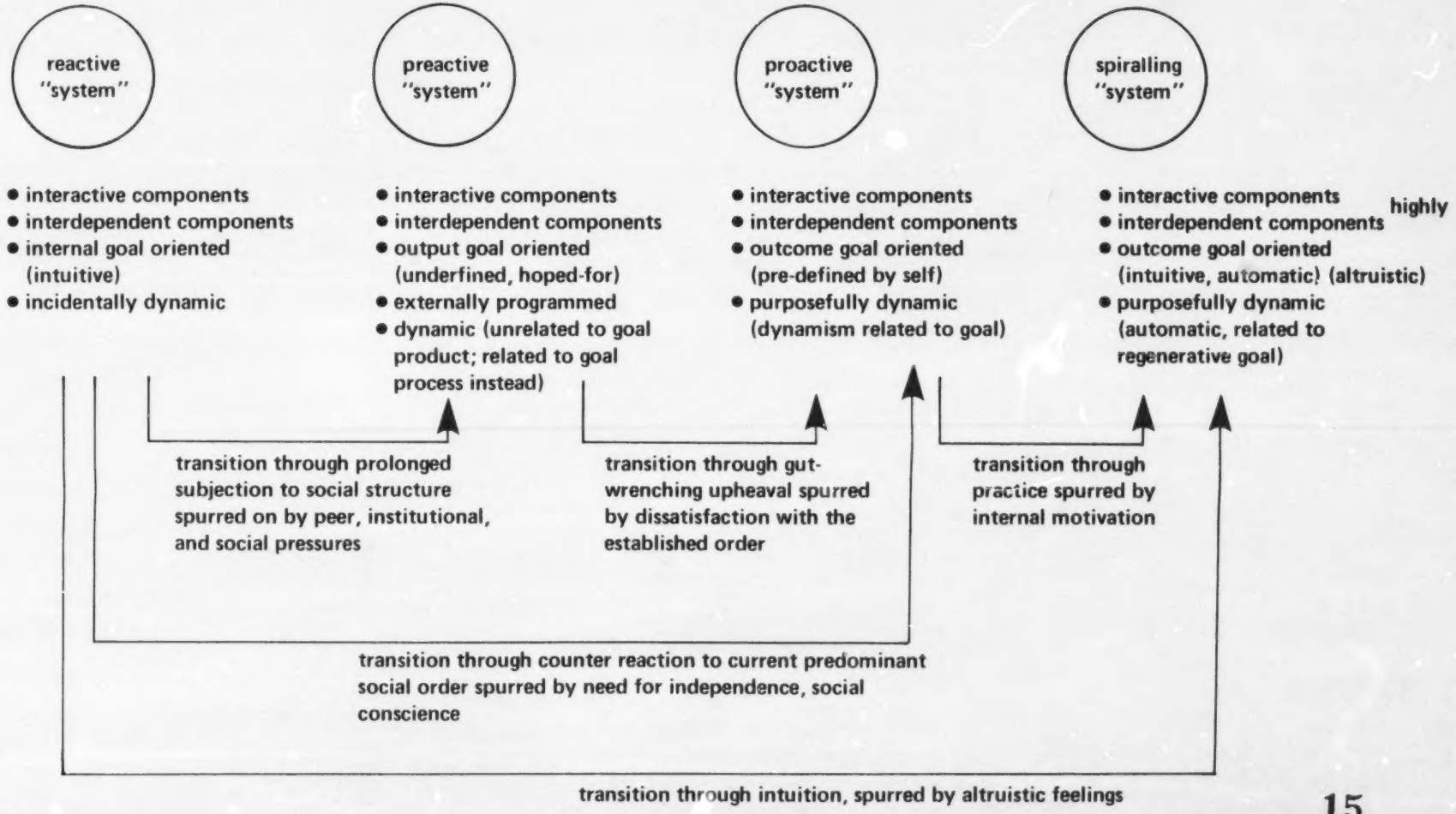
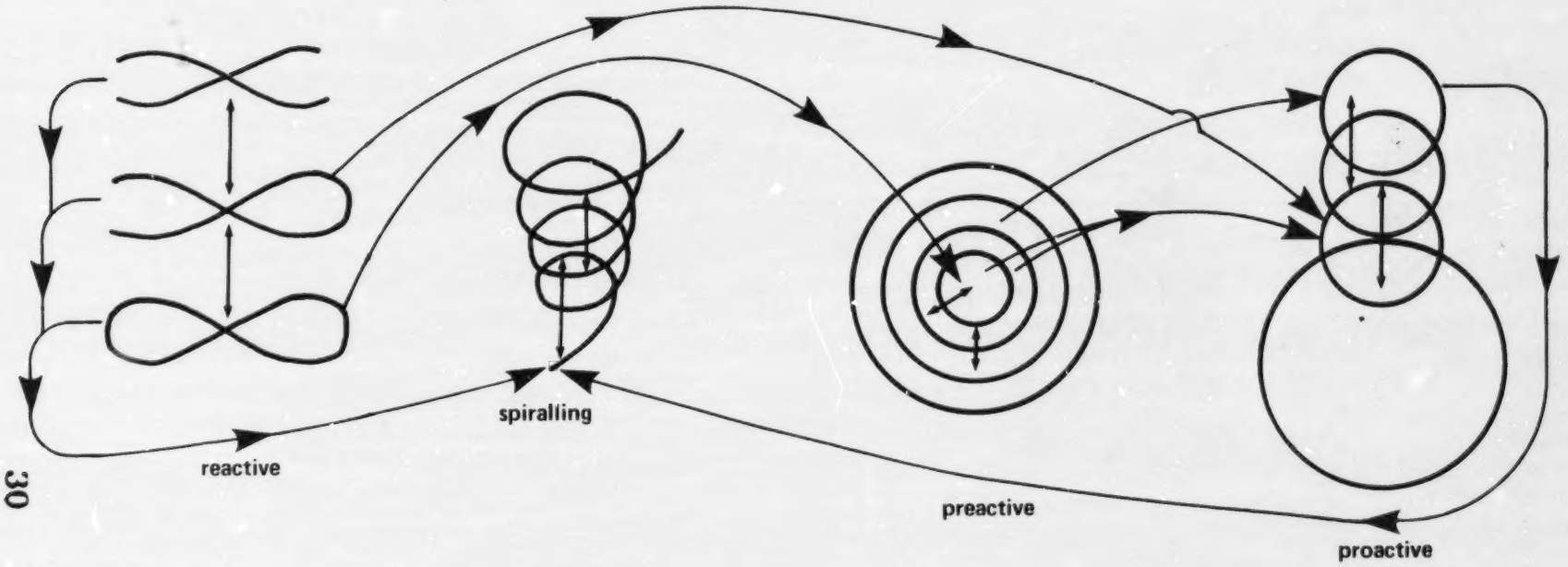

reactive "system"
preactive "system"
proactive "system"
spiralling "system"
• interactive components
• interdependent components
• internal goal oriented (intuitive)
• incidentally dynamic
• interactive components
• interdependent components
• output goal oriented (underfined, hoped-for)
• externally programmed
• dynamic (unrelated to goal product; related to goal process instead)
• interactive components
• interdependent components
• outcome goal oriented (pre-defined by self)
• purposefully dynamic (dynamism related to goal)
• interactive components
• interdependent components
highly
• outcome goal oriented (intuitive, automatic) (altruistic)
• purposefully dynamic (automatic, related to regenerative goal)
transition through prolonged subjection to social structure spurred on by peer, institutional, and social pressures
transition through gut-wrenching upheaval spurred by dissatisfaction with the established order
transition through practice spurred by internal motivation
transition through counter reaction to current predominant social order spurred by need for independence, social conscience
transition through intuition, spurred by altruistic feelings

Figure 4

Paradigm of Learner as Total System



This paradigm shows the three ability levels of each learner system (low, middle, and high); in each learner system there may be transition back and/or forth between these ability levels. In addition, transition may occur between certain learner systems.

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Abstract

In response to a loud and long call, from professionals in our field, for a research model that

(a) is not restrictive,

(b) does not limit generalizability,

(c) identifies the process variables that could improve the practice of education,

(d) addresses the whole learner as a total system,

(e) addresses the elaborate nature of learners as dynamic, changing individuals, and

(f) focuses on the aims and values of education,

this paper presents an alternative research methodology based upon a theoretical/conceptual paradigm of the learner as a total system (Beckwith, 1983).

The methodology assumes that each learner may be viewed as both and existing system and a potential system, and that the learner must be accepted as full partner in the research effort. While traditional methodologies focus upon frozen, tightly-controlled variables, this methodology focuses upon dynamism of interacting learner system components during the process of system maintenance and transition; the focus, rather than being within the framework of the goals of the educational system, is within the framework of the goals of the learner system.

As on-going/changing research in an on-going/changing context, the methodology embraces all variables, collapses the time between research and application, and facilitates generalizability within and across learner systems.

Research management is facilitated by the researcher's becoming a dynamic component of each defined, dynamic goal-directed learner system being studied.